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Some North American Botanists.

II. John Torrey.[1]

John Torrey was born in New York City, Aug. 15, 1796. His father, originally from New England, was a Captain in the Continental army and was among those who entered the city upon its evacuation by the British forces.

Of the boyhood of Dr. Torrey we know but little; he attended the public schools and was for a year at a school in Boston.

When a mere boy, while upon a visit in the country (the upper part of Manhattan Island was then "the country,") he saw two young men pass along the road, all travel-stained and laden with strange parcels. The unusual appearance of these young men prompted him to inquire about them, and he was told that they were "the Le Conte boy" and another whose name is forgotten, and that they were "botanists." Young Torrey for the first time saw a botanist, and he looked upon him as a curiosity, little thinking that he himself would in time be a chief among botanists. The "Le Conte boy" afterwards became the celebrated Major Le Conte, who contributed largely to botany and other sciences.

While still a youth it was Dr. Torrey's fortune to be brought into relations with Amos Eaton, who was the great instructor in popular science of his day, and it was through his teachings that he first learned the rudiments of botany.

Up to the time he became a medical student we know but little of his career. He had a marked natural talent for practical mechanics, and at one time seriously entertained the idea of becoming a machinist. He ultimately chose the medical profession and entered the office of Dr. Wright Post, the eminent physician and surgeon of his day.

Either during his apprenticeship, as it was then called, or after he entered the college of Physicians and Surgeons, he was an interested attendant upon the botanical lectures of the eminent Dr. Hosack, at the Elgin Botanical Garden. At that time young Torrey was an industrious collector and often carried to Dr. Hosack the fruits of his herborizations.

As a medical student Dr. Torrey must have devoted much

[1] An abridgement of a biographical sketch by Dr. George Thurber, prepared by the Editor of the *Bulletin of the Torrey Botanical Club.*

time to botany, as his "Catalogue of the Plants growing spontaneously within thirty miles of New York" was presented to the Lyceum in 1817, which was a year before he took his degree.

While yet a student of medicine, Dr. Torrey was one of the founders of the New York Lyceum of Natural History and, during its early career, was one of its most active members and contributed to its Annals many of its most important papers. In this mention of the Lyceum it may be well to state that by acting as its curator a young botanist from Western New York was enabled to pursue his botanical studies in New York. This young botanist is now known as Prof. Asa Gray.

After obtaining his medical degree, Dr. Torrey took an office in New York City, but the attractions of botany, mineralogy, entomology and chemistry prevented him from applying himself seriously to practice.

Soon after he was graduated, the expedition of Maj. Long was proposed, and Dr. Torrey was offered the position of botanist. He was greatly tempted to accept this opportunity for botanical distinction, but he had formed ties which were strong enough to keep him at home. Dr. Baldwin was appointed in his place and upon the death of Baldwin, who was an almost hopeless invalid from the start, the duties of botanist were performed by the surgeon of the expedition, Dr. James.

In 1820, Dr. Torrey published in Silliman's Journal "A Notice of Plants collected by Capt. N. Douglas around the Great Lakes at the Head Waters of the Mississippi.

In 1823, he contributed to the Annals of the Lyceum of Natural History "Descriptions of some new or rare plants from the Rocky Mountains, collected by Dr. Edwin P. James."

In 1824 he published "A Flora of the Northern and Middle States, or Systematic Arrangement and Description of all the Plants heretofore discovered North of Virginia." In this year he was married to Miss Eliza Robinson Shaw, and was settled at West Point as Professor of Chemistry in the U. S. Military Academy. This Flora, the concluding pages of which were written on the morning of its author's wedding day, is now rare, a large portion of the edition having been destroyed by fire. It contains over 500 species and includes the first twelve classes of the Linnæan system. In this work the author first manifested his acuteness in diagnosis, and it is remarkable for its elaborate and minute descriptions.

In this same year, 1824, we find "Descriptions of New Grasses from the Rocky Mountains" in the Annals of the Lyceum, and a "Monograph of the North American species of Carex," of which he was joint author with Schweinitz. Schweinitz had placed the paper in Dr. Torrey's hands, to edit and supervise the printing of it, during the author's absence in Europe. When Schweinitz found how much the value of his monograph had been increased by additions and revision, he insisted that Torrey's name should

appear as joint author, and that it should be quoted as Schweinitz & Torrey.

Foreseeing that the Linnæan system was to be supplanted by one founded upon a more profound knowledge of the structure of plants and broader views of their relationships, the Flora was not continued beyond its first volume, but its author, in 1826, published a Compendium which contained condensed descriptions of the plants enumerated in the first volume of the Flora and of those that would have been given in the second volume.

In 1826, Dr. Torrey read before the Lyceum "Some Account of a Collection of Plants made during a Journey to and from the Rocky Mountains, in the Summer of 1820, by Edwin P. James, M.D., Assistant Surgeon, U. S. Army." This memoir was not published until 1828. Before its publication its author, after three years' service, left West Point to assume the chair of Chemistry and Botany in the N. Y. College of Physicians and Surgeons. This account of Dr. James's Rocky Mountain plants is of especial interest as being the first botanical publication of importance in this country in which the plants were arranged according to the Natural System. Shortly before, the Abbe Correa had arranged a list, in which the genera named in Muhlenberg's catalogue were placed according to the system of Jussieu.

In 1831, Lindley's introduction to Botany was re-published in this country. Dr. Torrey prepared a catalogue of the North American genera, arranged according to Lindley's orders, which was published with the work and also separately in the pamphlet form.

Dr. Torrey was always fond of studying obscure and difficult orders, hence the Borraginaceæ, Chenopodiaceæ, Amarantaceæ, and Cyperaceæ had particular attractions for him. As early as 1836 he published in the Annals of the Lyceum his "Monograph of the Cyperaceæ." This contained, besides a full account of the other genera, a complete revision of the genus Carex, and was a most valuable contribution to North American botany, as it contained an elaboration of the species collected by Drummond, Richardson, Burke, and other British collectors, whose specimens were loaned by Sir William Hooker.

The Geological Survey of the State of New York was organized in 1836, and Dr. Torrey was appointed as its Botanist. His report, which was published in 1843, forms two enormous 4to volumes, filled with detailed descriptions of all the plants known to belong to the State, and is illustrated with 161 plates. When we consider that this work was produced amid the labors of his professorship at the Medical College, to which had been added those of the Chair of Chemistry at Princeton, we must wonder at the untiring industry of its author.

The first number of the "Flora of North America, by John Torrey and Asa Gray," appeared in 1838, the fruit of a most happy

association, which continued for over forty years, and which has done so much for the advancement of American botany.

The question why was not Torrey and Gray's Flora completed, has often been asked by those not familiar with the rapid progress of botanical discovery. The reason was this: By the time the first volume of the Flora was finished, new materials belonging to the orders contained in that volume demanded a large appendix, and a few years later new discoveries were so numerous that it was impossible for the work to keep pace with them. Its authors pursued the best course; instead of giving their time to the completion of the Flora and allowing the new materials to pass—as they inevitably would have done—into the hands of European botanists, they turned their attention to studying and recording them. Now these discoveries of American plants are mainly recorded by American botanists in American publications, and to secure this result it was well that the Flora was suspended. In this matter—of securing the new plants—both Doctors Torrey and Gray worked, sometimes together, oftener independently, but always with the fullest co-operation. The result has been a series of memoirs unequalled in scientific value by any that have been produced in recent botanical litarature. In chronological order we find that Dr. Torrey published in:

1843, Botany of Nicollet's Report;
1845, Botany of Fremont's 1st and 2d Expeditions;
1848, Botany of Emory's Military Reconnaissance;
1850, A Memoir on Batis. A Memoir on Darlingtonia and Plantæ Fremontianæ were accepted for the Smithsonian Contributions and published a year or two later.
1852, Botany of Stansbury's Report of his explorations in the region of Great Salt Lake;
1853, The Plants of Marcy's Red River Expedition;
1854, Botany of Sitgreave's Zuni and Colorado Journey.

The reports of the collections of the various Pacific Railroad surveys were published at intervals from 1855 to 1860, and then not in the order in which they were written.

Enumerating them as they occur in the volumes, we find in Vol. II: The Botany of Pope's, Beckwith's and Gunnison's expeditions, three comparatively brief memoirs in which Dr. Gray's name is mentioned as joint author.

Vol. IV: "Botany of Whipple's Expedition," the most important of all these Railroad surveys in botanical results.

Vol. V: "Botany of Lieut. Williamson's Report."

Vol. VIII: "Botany of Lieut. Parke's Expedition."

In other volumes of the railroad surveys are botanical reports by Newbury, Durand and others, to each of which Dr. Torrey contributed important materials, in many cases working up whole orders.

1861. The Report of Lieut. Ives' Exploration of the Colorado was published with a Botanical Appendix, mainly by Dr. Torrey.

The Report upon the Botany of the Mexican Boundary was published in 1859, the most voluminous, as it is the most important, of all these contributions to the botany of the far West. The survey was, on account of various changes, prolonged over a period of five years or more; it passed over a vast territory, which, for the most part was botanically new. Parry, Wright, Bigelow, Schott and Thurber all contributed their collections to make up this exceedingly valuable report, one which may fitly close the record of Dr, Torrey's more important contributions to science.

After the Report of the Botany of the Mexican Boundary was completed, Dr. Torrey transferred his invaluable herbarium and his library to Columbia College. As regards this herbarium, no other collection contains so many typical specimens from which the original descriptions were drawn. After it had been transferred to its new quarters it needed re-arrangement. Specimens had accumulated more rapidly than they could be disposed of, and all those collected by the recent expeditions had to be incorporated with the general herbarium. For several years succeeding the publication of the Report of the Mexican Boundary, Dr. Torrey was employed in herbarium work. No hand but his could properly perform this scientific drudgery, and he went at it with a perseverance that in time brought it to completion.

During these years of herbarium work, necessary though irksome, he was constantly examining plants and making sketches that might be useful thereafter. It was a peculiarity of Dr. Torrey that he always recorded his observations by means of the pencil, and if we look through the herbarium there will be found drawings of minute structure by hundreds, giving at a glance what he saw in examining a plant. While he published no drawings as his own, we can find traces of his handi-work all through the illustrations to his various memoirs.

The last important botanical contribution of Dr. Torrey was "The Revision of the Eriogoneae," the joint work of himself and Dr. Gray, published in the Proceedings of the American Academy in 1870.

Many years ago he elaborated that portion of the collections made upon the Pacific coast by the botanists of Wilkes' expedition. This, through the failure of appropriations, was not published upon its completion. One of the last acts of its author's life was to look over the manuscript of this report and commit its final revision for publication to Dr. Gray.

The fondness of Dr. Torrey for sciences other than botany has been already alluded to. At one time he was an enthusiastic student of entomology, or, as he expressed it—he "had the fever."

At one time he gave much attention to mineralogy, a pursuit in which he was often associated with another botanist—Nuttall.

The earlier volumes of Silliman's Journal contain important contributions to mineralogy from his pen. Mineralogy is so intimately related to chemistry that he retained through life a lively interest in this department of science.

Those who have regarded Dr. Torrey as a botanist only, will be surprised to know that the avocation of his life was that of a chemist, and that the works that have made him an undying name in science were done in what he regarded as his hours of recreation.

During the last years of his life he held the position of Assayer in the U. S. Assay office in New York, and this connection with the Treasury Department had one happy result. Although he had done so much in describing and naming the plants of the far west, he had traveled but little: he "had never seen a prairie," as he was once heard to say with a tone of sadness, and had never ascended a mountain higher than Mt. Marcy. It was a graceful act of the Secretary of the Treasury to send him in 1865 upon a confidential mission to California. He went by the way of the Isthmus and was able to see and enjoy the luxuriant vegetation of the tropics, and, when he reached his destination, was met by an order to make some extended explorations, for the accomplishment of which a revenue cutter was placed at his command. While in California he was able to see many of the plants he had described growing in their native localities, and to make considerable collections for the herbarium.

In 1872 he made another journey to California, this time by railroad. Upon his return journey he tarried awhile among the Rocky Mountains and ascended Torrey's Peak, which was several years before thus named by his former pupil, Dr. Parry. It is pleasant to think of him as passing the last days of his botanizing, in the evening of his life, among the alpine plants which in his youth he first made known to the botanical world.

Neither this last journey to California nor one made the previous winter to Florida served to arrest the disease which those who saw him only at intervals could perceive was gradually wasting his body, though it did not dim his intellect or impair his cheerfulness. At sunset on the tenth of March, 1873, he peacefully went to his rest.

Some Notes from Freshmen.

Professor W. J. Beal, of the Agricultural College, Lansing, Michigan, has just sent to us a few notes taken from the theses of his Freshmen. During a term of 12 weeks, when they begin daily lessons, each one writes a thesis on topics like those given below. A few hints are given directing the student how to proceed. After

making his observations, experiments, and notes, each student, usually alone with the teacher, gives the main points for his thesis. He may make additions before writing out the whole. These are read before the class and credit is given for the work. Of course more advanced students perform higher work.

What we need is just such information as is contained in this set of notes, and information as to methods in all of our botanical laboratories would be of great service to those of us who teach, for we must keep comparing notes in order to arrive at the most improved methods of training pupils. The notes from some of the theses of Dr. Beal's Freshmen are as follows:

THE TENDRILS OF VIRGINIA CREEPER.—J. A. DART tied weights to two old tendrils and found one sustained six pounds, another six and one-half pounds. A common sized tendril sustained five pounds. They were fastened to a high board fence. On a brick wall two large tendrils held five and six pounds respectively. The main stem of a vine six feet long contained twenty-five tendrils another contained twenty. One branch three feet long had twelve tendrils and supported 35 pounds. Some main vines have no tendrils, and the branches but few. There is quite a difference in vines about the number of tendrils and their capacity to stick to objects.

FERTILIZATION OF CATALPA SPECIOSA, WARDER.—E. S. ANTISDALE studied insects on the flowers of *Catalpa speciosa*. The flowers are too large for fertilization by honey bees or small humble bees. Their backs will not reach high enough to touch the stigmas and anthers. A large humble bee touches stigmas and anthers going in and out of a flower. The broad stigmas, before noticed by others, are sensitive and close in a few seconds after they are touched, close before a bee backs out of the flower. He covered up several panicles of flowers with mosquito netting. No bees were placed inside of two of these. Small humble bees were placed in a third sack containing flowers on which the bees were seen to work. No fruit set on any of these three. In the fourth net large humble bees were placed, but they failed to work on the flowers, and no fruit set in this case. In several flowers not covered with netting he saw a large humble bee working and watched it as the back was dusted with pollen and the stigmas closed. He marked three of these flowers, two of which set fruit.

ÆSTIVATION OF FUCHSIAS.—R. C. WILLIAMS examined the æstivation of 65 flowers of cultivated Fuchsias and made diagrams of all the forms. The sepals were all valvate. The petals were arranged in 45 different ways, several variations of the convolute prevailing. Some were reduplicate in whole or in part.

INSECTS CAUGHT BY APOCYNUM.—H. T. FRENCH examined insects about *Apocynum androsæmifolium* where they went for pollen and nectar. They are often caught while backing out of the bell-shaped flower. There are five wedge-shaped grooves made by the filaments—the larger part of the groove is at the base of the

corolla. One fly twisted his head off in the attempt to get away. Many small bees got caught, and mosquitoes too, quite often two to a flower. They are held by the tongue or the legs. Honey bees are large enough to escape or pull out. He could not discover that the capturing of flies or bees was of any advantage to the plant.

How the Seeds of Stipa are Planted by Nature.—Jesse J. Beal dropped about 20 fruits of *Stipa spartea* on a box of sand. The fruit has a long awn which is straight when wet and twisted when dry. Half the grains were dropped on sand where straws were stuck in every inch or so in every direction, the other half were dropped on sand without any straws or other objects on the surface. The grains were each held by the tip of the awn about as high as the plant grows, and each went down like an arrow, large end first, and all stuck in the sand but one. They were alternately wet and dried by sun and rain. They all bored into the sand except one. They went down just as well where there were no straws as where there were straws.

Flowering of Timothy.—E. C. Bank observed in cool damp weather, beginning June 29th, that a spike of timothy (*Phleum pratense*) put forth flowers (stamens) for ten days in succession, except none on the ninth day. In another place, in warmer weather, beginning July 15th, spikes put forth stamens for eleven days. Most flowers appear during a few days of the middle of these periods.

The Climbing of the Wild Morning Glory.—E. T. Gardner observed the wild morning glory (*Calystegia sepium*) and as in former years some dozen specimens were found twining the wrong way, following the course of the sun. A smooth post two inches in diameter was about as large as the vine would ascend.

Structure and Growth of the Cell Wall.

Prof. E. Strasburger's most recent publication is a work of 264 pp. entitled, "Ueber den Bau und das Wachsthum der Zellhaute" (On the Structure and Growth of the Cell-Wall). The book contains some most interesting contributions to our knowledge of the origin and growth of the cell-wall and starch grains, the function of the nucleus and the assimilation of carbon, and, based upon our previous knowledge and the author's investigations, offers some important theories in regard to the molecular structure of organized bodies.

So worthy of notice are some of the results at which he has arrived that we reproduce from the *Jour. Roy. Mic. Soc.* a summary of the salient points of the book, as follows:

With regard to the intimate structure of organized bodies,

Prof. Strasburger entirely dissents from Naegeli's micellar hypothesis. This hypothesis was based upon the phenomena of "swelling up" which are so characteristic of organized bodies, and upon the optical properties which certain of these bodies possess. Prof. Strasburger points out that swelling up may be as well ascribed to the taking up of water between the molecules of the body as to its being taken up between Naegeli's micellae. He shows also that the double refraction of organized bodies, such as cell-walls, and starch grains, depends upon their organization as a whole; for when once their organization is destroyed, their double refraction is lost, a result which cannot be explained on the micellar theory, since the particles of the disintegrated micellae would, like particles of broken crystals, still retain their power of double refraction.

According to Strasburger the molecules of an organized body are not aggregated into micellae which are held together by attraction, but are linked together, probably by means of multivalent atoms, by chemical affinity, in a reticulate manner. Swelling up is then the expression of the taking up of water into the meshes of the molecular reticulum, where it is retained by the intermolecular capillarity. The more extensible the reticulum, that is, the more mobile the groups of molecules within their position of equilibrium, the greater the amount of swelling up. The limit is reached when the chemical affinity of the molecules and the force of the intermolecular capillarity are equal; if the latter exceed the former at any moment, the result is the destruction of the molecular reticulum, or, in other words, of the organization. Protoplasm differs from other organized bodies in that the grouping of its molecules is undergoing perpetual change, the result of this molecular activity being the phenomena which we term vital. The growth in thickness of cell-walls and starch grains takes place, according to Prof. Strasburger, by the deposition of successive layers; in opposition to Naegeli's view, that the mode of growth was intussusceptive, with subsequent differentiation of layers. Even the surface growth of cell-walls is not, in his opinion, intussusceptive, but is merely due to stretching.

With reference to the mode of formation of the cell-wall and of the thickening layers, Strasburger agrees with the view of Schmitz that the cell-wall is formed by the actual conversion of a layer of the protoplasm, that is, chemically speaking, by the production of a layer of cellulose from a layer of proteid. When a mass of protoplasm is about to clothe itself with a membrane, the peripheral layer becomes densely filled with minute proteid bodies, the microsomata, and this layer then becomes converted into cellulose. The wall of a young wood-cell of *Pinus*, for instance, is clothed internally with a layer of protoplasm filled with microsomata, which are arranged in spiral rows; the microsomata then gradually disappear and the layer of protoplasm is found to

be replaced by a layer of cellulose, which presents spiral striation corresponding to the previously existing rows of microsomata, and which constitutes a thickening layer of the cell-wall. In cells the walls of which become much thickened, the whole of the protoplasm may be gradually used up in this way. Again, the wall of pollen-grains and of spores is formed from a peripheral layer of the protoplasm which contains abundant microsomata. Its subsequent growth, and especially the development of the asperitus which it commonly presents, is effected by the surrounding protoplasm which is derived from disorganized tapetal cells; this is especially well shown in the development of the epispore of *Equisetum* and of *Marsilia*. When an intine or endospore is present it is produced like the outer coat from a peripheral layer of the protoplasm of the pollen-grain or spore. Further, the septum which is formed in the division of a cell is produced in the same way.

The cell plate, like the peripheral layer of the protoplasm of a young pollen grain, contains microsomata which disappear, and it is then converted into a plate of cellulose. Finally, the successive layers of a starch grain are produced by the alteration into starch of layers of proteid-substance derived from the starch-forming corpuscle (amyloplast).

Professor Strasburger next points out that the starch which makes its appearance in the chlorophyll-corpuscles under the influence of light, is derived from the proteid of the corpuscles by dissociation. The formation of this starch is therefore not the immediate product of the synthetic processes going on in the chlorophyll-corpuscles, but only a secondary product. The processes in question produce proteid. Prof. Strasburger is inclined to accept Erlen Meyer's hypothesis that methyl aldehyde is formed in the chlorophyll-corpuscles from carbon dioxide and water, and to believe that by polymerization a substance is produced which can combine with the nitrogenous residues of previous dissociations of proteid to reconstruct proteid. He does not agree with the suggestion of Loew and Bokorny that the methyl aldehyde may combine with ammonia and sulphur to form proteid *de novo*.

Lastly, Prof. Strasburger makes a suggestion as to the probable physiological significance of the nucleus. He points out that the nucleus cannot be regarded as regulating cell-divisions; for instances are known of cell-division taking place without previous nuclear divisions, and conversely, of nuclear-division taking place without cell-division. He is of opinion that the nucleus plays an important part in the formation of proteid in the cell. This view is founded upon the fact that one or more nuclei have been found to be present in the vast majority of plant-cells, that the nucleus is, as a general rule, the most persistent protoplasmic structure, and that it gives the various proteid reactions in a very marked manner.

GENERAL NOTES.

Liquid exudation in Mahonia.—"The same observer detected a similar exudation from the pistil"—in *Mahonia*, the itemizer should have added. See p. 163, line 20.—T. M.

Some California Plants.—On the last day of the old year the following plants were in bloom under three inches of snow in the vicinity of Oakland:

Ranunculus Californicus	Boisduvalia densiflora
" Bloomeri	Œnothera ovata
*Eschscholtzia Californica	*Cotula coronopifolia
Cardamine pauciseeta	*Grindelia robusta, var.
Lepigonum macrothecum	Wyethia helenoides
Claytonia perfoliata	Troximon grandiflorum
Erodium cicutarium	Megarhiza Californica
Lupinus Chamissonis	Garrya elliptica
Vicia Americana, var.	Solanum umbelliferum
Lathyrus vestitus	Cynoglossum grande
Fragaria Californica	Castilleia foliolosa
Rubus ursinus	Scutellaria tuberosa
Ribes Menziesii	*Umbellularia Californica
* " sanguineum	Dirca occidentalis

The asterisk-marks species usually in bloom by Christmas. *Eschscholtzia*, *Cotula* and *Grindelia* are everblooming. *Claytonia* and *Erodium* are annuals. Besides these plants, "hold-overs" of the dry season, such as *Solidago*, *Aster*, *Gnaphalium*, etc., were seen in bloom. The introduced weeds *Raphanus*, *Brassica*, *Capsella*, *Anagallis*, *Urtica urens*, etc., were plentifully in bloom. Our first rains were followed by unprecedentedly warm weather which lasted till near the middle of December. Since Christmas it has been remarkably cold.—VOLNEY RATTAN, *San Francisco*.

Plantago pusilla, Nutt.—The ordinary form of Missouri and Illinois, where it is common, and as far as I can see of the Eastern States, where it is much rarer, has linear or filiform entire leaves, scapes 2 to 4 or rarely 6 inches high, obtusish or subacute bracts of the length of the orbicular sepals and short oval slightly exsert capsules, 4 seeds about 1.3 mm. or 0.6 line long.

Var. MACROSPERMA is a larger form, 4 to 7 inches high, with longer, much exsert capsules; seeds nearly twice the length of the last, 2.4 mm. or 1.2 lines long.—Saline soil of the western plains; on the Shienne River, *Nicollet*, and near the mouth of the Yellowstone River, *Hayden*.

Var. MAJOR, much larger and stouter, leaves lanceolate-linear, often 1½ to 2 lines wide, the larger ones laciniate with few long teeth or lobes; scapes densely woolly at base, with the elongated spike often 9 inches high; bracts acute, longer than the sepals; seeds intermediate in size between the two other forms.—Near Atoka, north of Red River in the Indian Territory, *G. D. Butler*.

Dr. A. Gray thinks that he has proofs that this species, or probably the second form of it, is the lost *P. elongata*, Pursh, Fl. Suppl. p. 729,

but even if so, Nuttall's name, now well known since more than 60 years, ought to be retained in place of a doubtful and very inappropriate one.—The three closely allied species, *P. Bigelovii* and *P. pusilla* with 4 seeds, and *P. heterophylla* with numerous ones, have all pitted seeds, well seen only in perfectly mature specimens. The seeds become gelatinous when wet.—G. ENGELMANN.

Forest Fires in Oregon.—The forests of Eastern Oregon are found only at an elevation of 3,500 to 4,000 feet and upwards. Fires, when the growth is thick, as it commonly is, destroy everything. The first plant to occupy the land is *Epilobium spicatum* (called "Elk Weed" here). This seems to be the only herbaceous plant to follow the fires. In a year or so the ground is occupied by seedlings of the same species that covered it before, viz: Black Pine (*P. contorta*, var.) and Red Pine (*Pseudotsuga*); also, in about their usual proportion, the three or four other coniferous species common to this region. The youug growth is commonly very dense and grows rapidly. In 15 or 20 years the saplings will be 20 to 30 feet high and 2 to 4 inches in diameter, the pine occupying the ground mostly.

In Western Oregon it seems to take more time to replace the destroyed forests. The trees are much larger and are slower to decay. The ground is soon covered by a thick growth of blackberry plants (*R. ursinus*) and also raspberry, the latter more scattering. With these the seedling forest trees have to contend. But in time they overcome them and occupy the land exclusively, as did their ancestors. In the coast mountains there appears to be an exception to the rule that the burned forest is soon replaced by young trees of the same species. There is a large section of the country lying between the Willamette Valley and the Gaquinna Bay in wich the forest growth, which must have been very thick, has been entirely destroyed. This region is now thickly covered by a growth of Cherry (*P. emarginata*), which occupies the land to the exclusion of almost everything else. The thick growth no doubt preventing, as it apparently has done for 40 or 50 years and seems likely to for all time to come, the young conifers from getting a hold.—WM. C. CUSICK, *Union, Oregon.*

Elastic Stamens of Urtica.—The curious discharging of pollen by the elastic stamens of *Pilea microphylla*, Liehm., the "Artillery plant" of our window gardens, coupled with the text-book assertion that in the sub-order *Urticeæ* the filaments are "transversely wrinkled and inflexed in the bud, straightening or spreading elastically when the flower opens," are reasons enough for expecting a forcible discharge of pollen in our common nettles. This discharge seems to take place only under the most favorable circumstances however, for a long observation of the nettles failed to reveal any extraordinary phenomena. It was a pleasant surprise to suddenly observe last fall a huge plant of our common *Urtica gracilis* enveloped in a shower of pollen. The plant grew on heavy muck,

and was consequently growing rapidly. The day was excessively hot and sultry, a thunder shower having passed but a short time previously. The discharge of pollen was so copious as to attract one's attention for several rods. By examining the flower buds with a glass the tips of the sepals could be seen to gradually spread apart, to be in two or three minutes suddenly laid open by the straightening of the stamens. Usually two opposite stamens would straighten at the same time, though often but one at a time. Frequently all four would pop out of their cramped position at once. The anthers opened simultaneously with the liberation of the stamens, and the pollen was thrown five or six inches. The stamens straightened themselves to a perfectly horizontal position, the filament usually twisting half or a quarter way round at the same time. The stamens on a severed branch of the plant continued to open elastically for five or ten minutes. Subsequent observations after showers in warm weather when the plant was growing vigorously often revealed the pollen discharge, but in very much less quantity and vigor than in the first case. The phenomenon could never be observed in *Urtica dioica*. No doubt proper culture in a hot-house would discover our common nettle to be one of our most interesting plants, at least much more so than the little *Pilea*!—L. H. BAILEY, JR., *Cambridge, Mass.*

C. S. Rafinesque.—The generally accepted impression that he was a Sicilian is probably incorrect. At least he tells us in his "*Life and Travels*," "I was born at Galeta, near Constantinople, inhabited by Christian merchants and traders, my father being a French merchant of Marseilles."

In addition to Rafinesque's genera "in the region covered by Gray's Manual," *Pachystima* may be added, discovered since the last edition of the Manual appeared, though not the species on which the genus was founded.

When I was a young man in Philadelphia, thirty years ago, some of Rafinesque's contemporaries were still living. His chief home was here, and here in a dingy garret, with scarcely a loaf of bread to eat, he worked for science, as he understood it, to the last. He died on a cot with hardly a rag to cover him, and without a solitary friend to stand by him in his last hours. Bringhurst, a kind hearted undertaker, committed his body to the earth, and for years a pine board with "C. S. R." was all that marked his last resting place.

From all I have been able to learn from those who knew him, and from what I have been able to gather from his writings, the summary in the GAZETTE scarcely does him justice, though perhaps justified by the statements heretofore published by those who had but imperfect knowledge of the man. It can scarcely be said of him that "he preferred self to truth" in the common acceptance of these terms. He endured rarely paralleled misfortunes, and sacrificed a large fortune for the sake of science, and it is doubtful if what the world understands as "truth" was ever sacrificed to anything by Rafinesque. His remarks on

his contemporaries were often sharp, and naturally excited aversion, and perhaps to this aversion we may refer some of the omission to receive as much credit as might be his due. But he often speaks admiringly of those he had lanced, and it is evident that, unwise in his discourtesy, it was not at any rate engendered in malice.

But he made species? Not long ago I read the introduction to a work in which the author complained that of some hundred or more species he had described, a contemporary had done him the gross injustice of not leaving him a dozen! It is no uncommon fault.

And he was an egotist? But I have lived to learn that in this respect at least "every man has his price." Let us meet in spirit around his unhonored grave in old Ronaldson Cemetery, remembering his sacrifices, grateful for what he did, and tried to do, and not forgetting that we too are but human as was he.—THOMAS MEEHAN.

EDITORIAL NOTES.

IT MAY SEEM to some that we have departed somewhat from the natural order of things in selecting Dr. Torrey as the subject of the second sketch in our series of "Some N. Am. Botanists;" but we are compelled to publish these sketches, not as we would, but as we can.

THE AMERICAN MONTHLY MICROSCOPICAL JOURNAL begins the new year with S. E. Casino, of Boston, as publisher and every evidence of prosperity. When an editor can be relieved from all clerical work his literary work is that much better and we now expect from Mr. Hitchcock a journal even more entertaining than it has been.

PROFESSOR G. MACLOSKIE, of Princeton, presented at Montreal a paper on "Achenial Hairs and Fibers of Compositæ," which now appears illustrated in the *Naturalist*. The object of his study seems to have been an attempt to discover some additional tribal characters, a thing very acceptable in this large and very homogeneous order. If the characters from the achenial hairs, etc., prevail it will necessitate considerable readjusting of tribes, "yet the parallelism between the structure of the hairs and the affinities of the groups, as founded on other characters, is singularly complete."

DR. L. ERRERA finds glycogen in the tissues and asci of ascomycetous fungi and also in *Linum* and *Solanum*. He has established completely the identity of the glycogen in *Peziza vesiculosa* (which he has studied most closely) and that of the mammalian liver. When not in too small quantity plant glycogen may be detected by its reaction with iodine, giving a brownish red color which disappears on heating and reappears on cooling. The discovery of the existence of this carbo-hydrate in plants breaks away another of the attempted absolute distinctions between plants and animals. Glycogen seems to perform the same functions in both organisms.

PROFESSOR DOUGLASS H. CAMPBELL, of Ann Arbor, has been showing the development of the male prothallium of *Equisetum arvense*, and recommends its use by laboratory students as a plant that is

common and very satisfactorily studied. The growth of the fertile plant is very rapid, making the cells large and distinct. Besides, "the spores germinate very readily if sown immediately after maturing, and offer a most interesting example, in their development, of the growth and division of cells. Within a few weeks of sowing, the antheridia are produced abundantly, containing antherozoids of extraordinary size, much larger than those of the mosses and ferns."

F. PAX, after describing in detail instances of phyllody of the carpels of *Aquilegia vulgaris* and *formosa*, states as his opinion that the two integuments of the ovule are equivalent to a leaflet. He also shows the identity of this leaflet with the pinnule of the fertile frond of a fern and in the following table expresses the homology of the parts:—

Fern.	*Ovule.*
Spore.	
Macrospore.	Embryo-sac.
Macrosporangium.	Nucellus.
Sorus,	Several nucelli.
Pinnule.	Ovular leaflet.

WE HAVE RECEIVED an advanced copy of the report of the Professor of Botany and Horticulture of Michigan State Agricultural College. Every botanist knows that this Professor is Dr. W. J, Beal, one of the most successful teachers of botany in this country. Dr. Beal's methods of instruction are widely known through the publication of a paper prepared by him entitled "The New Botany," a paper which has gone into the general circulation which it so well deserves through its republication by Chas. Marot, of the *Gardener's Monthly*. The report just received shows not only Dr. Beal's methods of instruction, but, what is a considerable solace to some of us, the means at his disposal. Finely equipped as he is with natural gifts, these are supplemented by appliances which are exceptional in the West, botanic garden, greenhouses, and *time* furnishing splendid opportunities for studying botany in the only right way. To those of us having no greenhouses, no botanic garden, and only about 30 hours all told, and those in a season when nature's botanic garden makes very little display, Dr. Beal's account of his methods was rather discouraging. This report shows that the author is a very busy man, but as all this hard work has brought success, he is rather to be envied than pitied.

PROF. J. C. ARTHUR has made an interesting discovery in the study of the Schweinitzian species and specimens of microscopic fungi, which throws considerable light upon what was very perplexing before. In several cases no ingenuity could make the Schweinitzian specimens agree with the descriptions undoubtedly based upon them. One illustration used is that of *Uromyces Lespedezæ*, which Schweinitz described as having two-celled spores and hence included under *Puccinia*, when every student knows that the spores are unicellular. Prof. Arthur was much puzzled over such discrepancies until it occurred to him to consider the microscopes and methods of manipulation which were used by the author in question. This at once furnished the key to the riddle, for putting some dry spores of the fungus mentioned upon a slide and using

a half-inch objective, they all appeared two-celled, owing to the thickening of the apex, which often occupies half the length of the spore. This furnishes us another way of explaining the discrepancies of authors of an earlier day, without blaming them either with carelessness or wilful misrepresentation.

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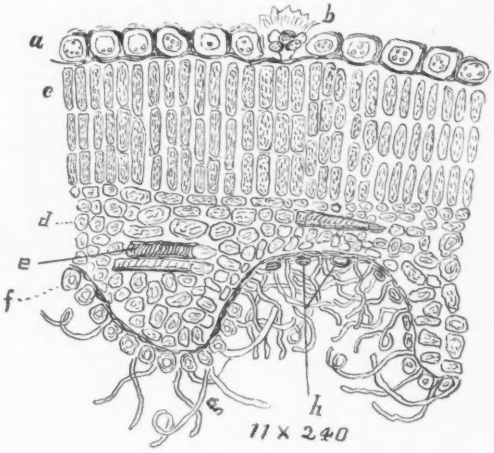

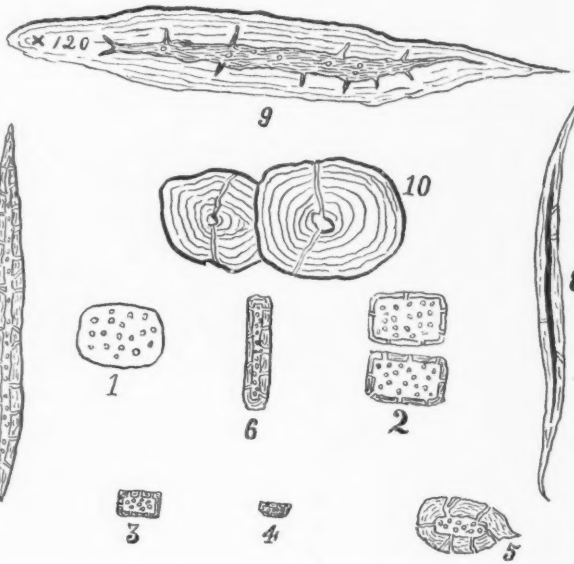

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